

Phytoseiid Mites on Tree Crops, Ornamental and Wild Plants in the Netherlands

by

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1. Some Phytoseiids collected on fruit trees.

INTRODUCTION

Natural enemies of spider mites have received increasing attention because of their potentials to reduce their prey population considerably. Crop losses due to phytophagous mites have been reported (CHAPMAN *et al.*, 1952; LIENK *et al.*, 1956; VAN DE VRIE, 1956; HUSSEY and PARR, 1965) as well as reduction in growth and disturbance in the host plant's physiology (LIESERING, 1958, 1960; ZUKOVA, 1963; AVERY and LACEY, 1968; STORMS, 1971). Spider mites occupy a pest status only on cultivated plants and are of relatively little importance in undisturbed environments (LORD *et al.* 1958; PUTMAN and HERNE, 1959, POST, 1962). Spider mite problems have been intensified by the development of resistance against formerly effective acaricides (HELLE, 1965).

Two main hypothesis concern mite outbreaks. One is that improved cultural methods result in more nutritious host plants. This promotes increased fecundity (CHABOUSSOU, 1960; RODRIGUEZ, 1958; STORMS, 1971) so that mite outbreaks occur independent of action of their enemies. The second hypotheses is that modern insecticides reduce the natural enemies drastically occasioning spider mite outbreaks frequently and giving rise to pest status of previously innocuous species. For a more detailed discussion of these phenomena the reader is referred to HUFFAKER *et al.*, (1969); MCMURTRY *et al.*, (1970), and HUFFAKER *et al.*, (1970).

The predatory mites of the family Phytoseiidae have received wide-spread attention (MCMURTRY *et al.*, 1970; DOSSE, 1960; COLLYER, 1964a, b; VAN DE VRIE and BOERSMA, 1970). In the present paper some species found on fruit trees in the Netherlands are listed and some general remarks on their relative abundance along with some ecological notes are presented. In future papers some more species collected on fruit trees, row crops, ornamentals, and wild plants will be treated.

METHODS AND MATERIALS

All specimens were removed by hand under a dissecting microscope from leaf samples. The mites were collected in Oudemans' Fluid, with the following formula:

87 parts alcohol 70%
5 parts glycerin
8 parts acetic acid.

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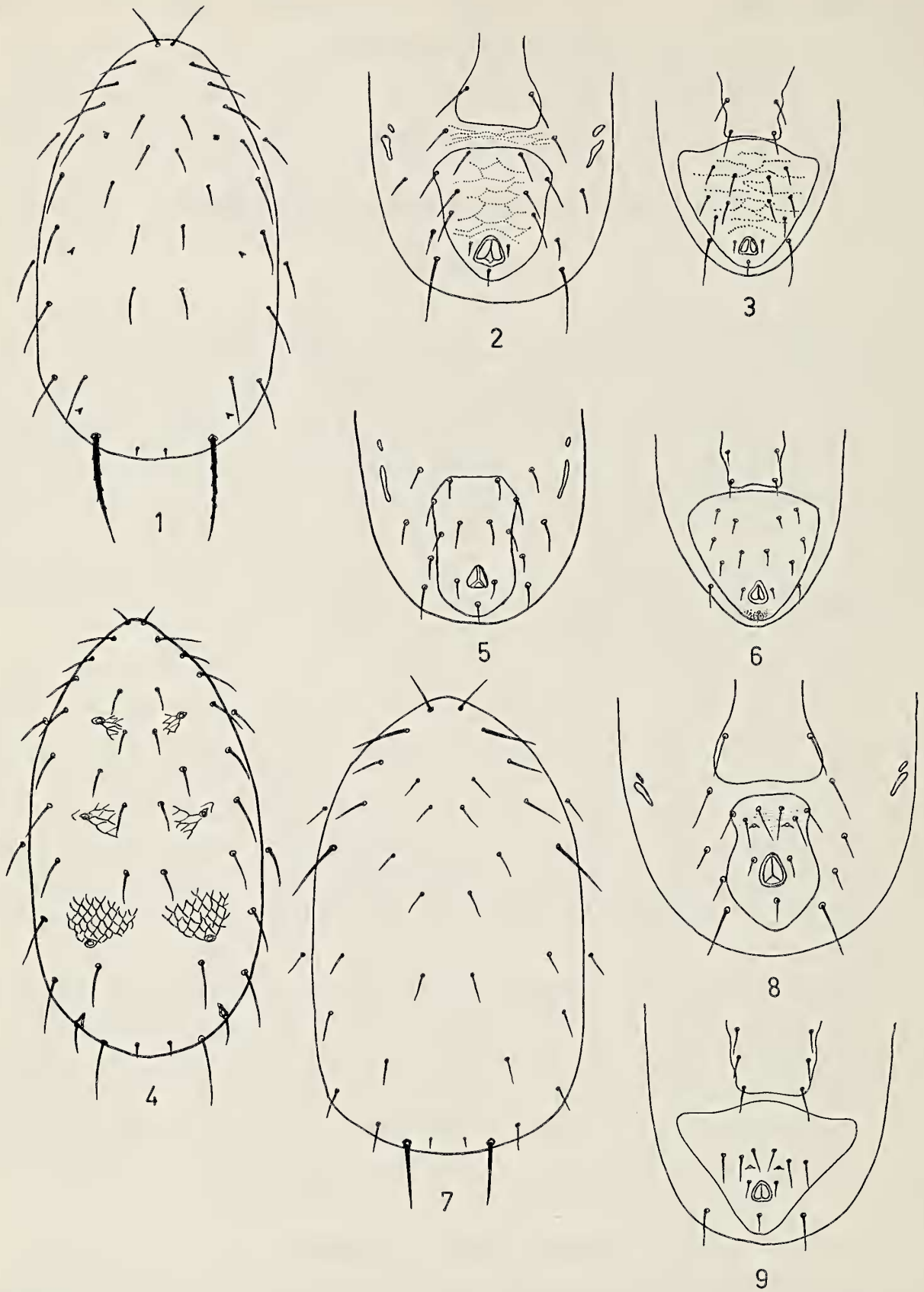


Fig. 1—3: *Typhlodromus (T.) pyri*; 1. female dorsal surface; 2. female posterior ventral surface; 3. male posterior ventral surface. Fig. 4—6: *Typhlodromus (T.) tiliarum*; 4. female dorsal surface; 5. female posterior ventral surface; 6. male posterior ventral surface. Fig. 7—9: *Typhlodromus (A.) finlandicus*; 7. female dorsal surface; 8. female posterior ventral surface; 9. male posterior ventral surface.

Specimens can be stored in this fluid for prolonged periods.

Mounting is usually preformed in Berlese Fluid. We obtained the best results with the following formula:

- 50 cc distilled water
- 30 gm arabic (clear crystals)
- 200 gm chloral hydrate
- 20 gm glycerin.

Clearing and staining is preformed in lactic acid and 'Direkttiefschwarz' (DOSSE, 1957) on a water bath during a period of 30 to 45 minutes. Finally, the slides are sealed with Canada Balsam after allowing them to dry for a period of several weeks at room temperature.

TAXONOMY

The generic classification used is that of CHANT (1959, 1965); identification of the species listed in this paper is based on keys by CHANT (1959). All specimen are in the writer's collection.

Typhlodromus (Typhlodromus) pyri Scheuten (Fig. 1, 2, 3)

Typhlodromus pyri SCHEUTEN, 1857 : 104—112

Typhlodromus tiliae OUDEMANS, 1929 : 14—15

Typhlodromus tiliae Oudemans, NESBITT, 1951 : 18—21

Typhlodromus pyri Scheuten, CHANT, 1959 : 64

Typhlodromus pyri Scheuten, DOSSE, 1961 : 191

Typhlodromus pyri Scheuten, COLLYER, 1964 : 364.

This is one of the most abundant and widespread species in the Netherlands and it is widely distributed in Europe and North America and Canada (NESBITT, 1951; CHANT, 1959; DOSSE, 1961; SCHUSTER and PRITCHARD, 1963; COLLYER, 1964; VAN DE VRIE, 1964). In the Netherlands it is commonly found on unsprayed fruit trees in association with *Panonychus ulmi* (Koch) and *Bryobia rubrioculus* Scheuten. It has been collected also from peach in green houses. In England it is regarded as the most important predator of *P. ulmi* (COLLYER, 1964). It has also been collected from many other host plants. DOSSE (1960) studied the influence of this predator on the development of *P. ulmi* populations in Germany; COLLYER (1964) did so under English conditions. It is a leaf-inhabiting species; it hibernates exclusively on twigs and thin branches.

Typhlodromus (Typhlodromus) tiliarum Oudemans (Fig. 4, 5, 6)

Typhlodromus tiliarum Ouedemans, NESBITT, 1951 : 31

Typhlodromus tiliarum Oudemans, COLLYER, 1956 : 206, 208.

Typhlodromus tiliarum Oudemans, CHANT, 1959 : 65

Typhlodromus tiliarum Oudemans, VAN DE VRIE, 1964 : 233.

Collected in the Netherlands on neglected fruit trees in relatively small numbers, but occurring in all fruit growing districts. Usually found in association with small numbers of *P. ulmi*, although it does not appear to be an efficient predator. It is a leaf-inhabiting species hibernating on twigs and thin branches. Collected in Eastern Canada (CHANT, 1959), England (COLLYER, 1956) and Central Europe (BOCZEK *et al.*, 1970).

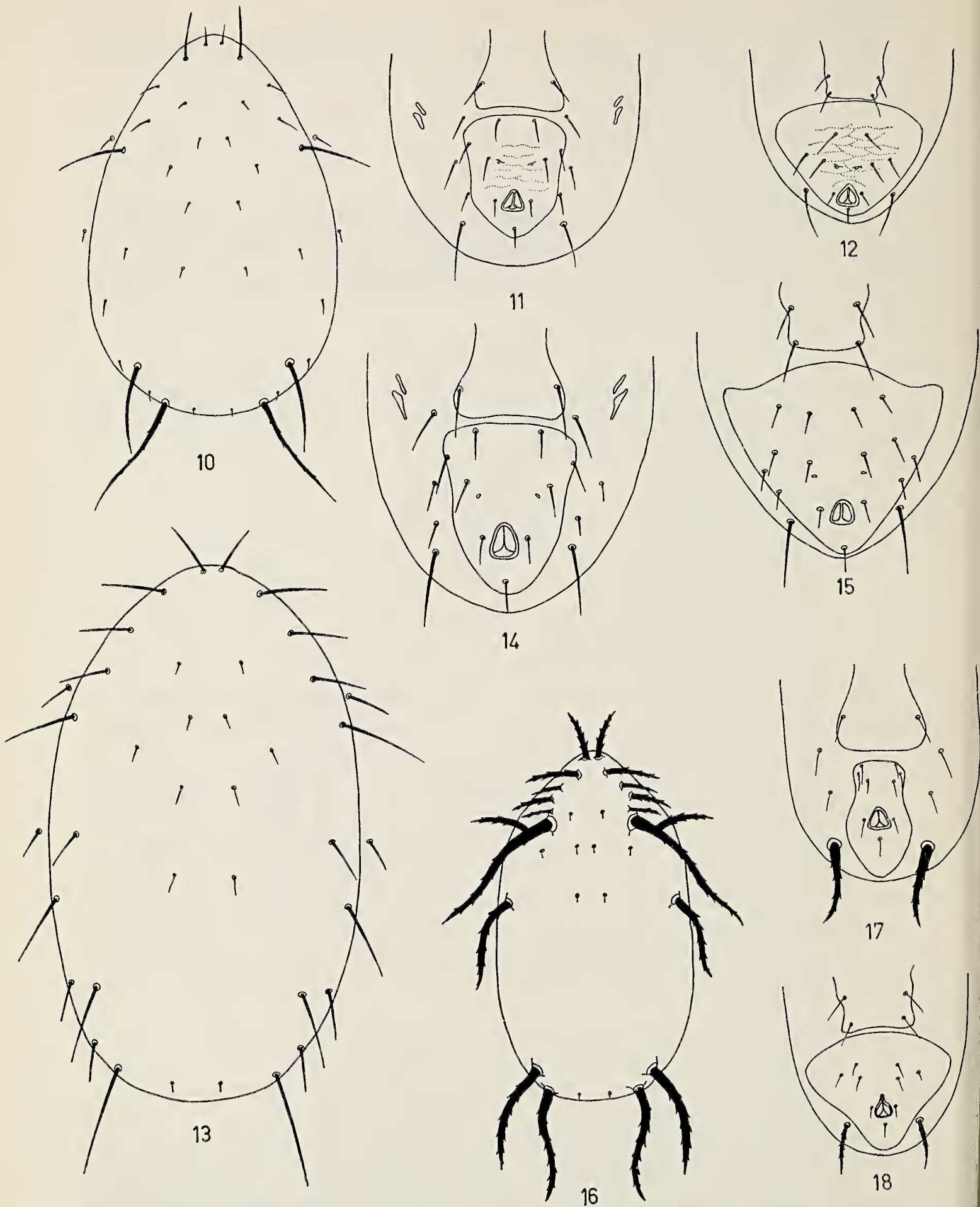


Fig. 10—12: *Typhlodromus (A.) potentillae*: 10. female dorsal surface; 11. female posterior ventral surface; 12. male posterior ventral surface. Fig. 13—15: *Typhlodromus (A.) masseei*; 13. female dorsal surface; 14. female posterior ventral surface; 15. male posterior ventral surface. Fig. 16—18: *Phytoseius (D.) macropilis*; 16. female dorsal surface; 17. female posterior ventral surface; 18. male posterior ventral surface.

Typhlodromus (Amblyseius) finlandicus (Oudemans) (Fig. 7, 8, 9).

Typhlodromus finlandicus (Oudemans) NESBITT 1951 : 25—26

Typhlodromus finlandicus (Oudemans) COLLYER 1956 : 206

Typhlodromus finlandicus (Oudemans) CHANT 1959 : 67

Typhlodromus finlandicus (Oudemans) KROPCZYŃSKA 1970 : 41.

This species is commonly found on fruit trees, often in association with *P. ulmi* and Eriophyids. It seems to be an efficient predator of *P. ulmi*; under experimental conditions it reduced this species to uneconomical densities (GRUYS and VAN DE VRIE, unpublished data). COLLYER (1964) provided experimental evidence that this species reduced *P. ulmi* as efficiently as *T. pyri*. CHANT (1959) concluded that *T. finlandicus* is potentially a more efficient predator of *P. ulmi* because of its similarity in distribution, a conclusion challenged by VAN DE VRIE (1964) and HUFFAKER *et al.* (1969). KROPCZYŃSKA (1970) studied its biology and ecology in Poland in detail. She found that beside spider mites, pollen, honey dew, plant sap and fungus spores are utilized as food, this enabling the predators to survive and even reproduce during periods in which spider mites are not present. It is a leaf-inhabiting species; hibernating takes mainly place on twigs and branches.

Typhlodromus (Amblyseius) potentillae (Garman) (Fig. 10, 11, 12).

Amblyseius potentillae GARMAN 1958 : 76—77

Typhlodromus potentillae (Garman), CHANT, 1959 : 93

Typhlodromus potentillae (Garman), VAN DE VRIE and BOERSMA, 1970.

This species is quite common on fruit trees in the Netherlands. It is usually found in association with *P. ulmi* and *B. rubrioculus* on neglected or lightly sprayed fruit trees. According to our experimental evidence it is an efficient predator of *P. ulmi* because of its ability to maintain itself at low prey densities and being able to prevent *P. ulmi* from reaching damaging densities (VAN DE VRIE and BOERSMA, 1970). It has been reported also from Central Europe (BOCZEK *et al.* 1970) and U.S.A. (GARMAN, 1958). It closely resembles *T. (A.) similoides* Buchelos and Pritchard (1960).

Typhlodromus (Amblyseius) masseei Nesbitt (Fig. 13, 14, 15).

Typhlodromus masseei Nesbitt, 1951 : 27—28

Typhlodromus masseei Nesbitt, COLLYER, 1956 : 204—206.

Typhlodromus masseei Nesbitt, CHANT 1959 : 75

Typhlodromus masseei Nesbitt, BOCZEK *et al.* 1970 : 49.

This large species is commonly found on branches and stems in association with Oribatid mites and relatively rarely on the leaves of fruit trees. In our opinion it is a bark-inhabiting species. Reproduction was found to start early in the season before either *P. ulmi* or *B. rubrioculus* was active. Moreover, eggs or juvenile stages have never been collected from the leaves, but were frequently found under bark scales, in cancer wounds etc. We never collected it from other host plants than apple.

Phytoseius (Dubininellus) macropilis Banks (Fig. 16, 17, 18).

Sejus macropilis Banks, 1909 : fig. 16

Phytoseius spoofi (Oudemans), NESBITT, 1951 : 57

Phytoseius macropilis (Banks), COLLYER 1956 : 206

Phytoseius macropilis Banks, CHANT 1959 : 107.

Phytoseius macropilis (Banks), CHANT and ATHIAS-HENRIOT 1960 :
219—221

Phytoseius macropilis (Banks), CHANT 1965 : 904—907.

This species is easily distinguished from other Phytoseiids because of its large, serrated setae, which give in the mite a rough appearance. It is commonly found on neglected fruit trees, especially plum, and often in association with Tydeid mites. It does not seem to feed upon Tetranychids, but a final conclusion cannot be given as experimental data are lacking. It seems to be a wide-spread species as it has been reported from Canada, U.S.A., and various European countries (NIESBITT, 1951; COLLYER, 1956; CHANT, 1965; DABROWSKI, 1970).

Summary

The occurrence and relative abundance of six species of Phytoseiids on fruit trees in the Netherlands is discussed together with their distribution in other parts of the world. Some ecological notes are presented.

Acknowledgement

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Karg, Wolfgang, Acari (Acarina), Milben, Unterordnung Anactinochaeta (Parasitiformes). Die freilebenden Gamasina (Gamasides), Raubmilben. in: Friedrich DAHL, Die Tierwelt Deutschlands, 59. Teil, 1971, p. 1—475, fig. 1—516, uitgave Gustav Fischer, Jena (DDR), prijs 102,60 Mark.

Dit boek behandelt vele genera met omstreeks 650 soorten Gamasina voor zover zij vrij of bijna vrij in de natuur voorkomen en is uiteraard beperkt tot Midden-Europa. Het geeft als algemeen gedeelte 71 pagina's met waardevolle gegevens en wenken voor de studie. Het overige gedeelte bestaat in hoofdzaak uit tabellen met korte beschrijvingen en uit gegevens over het milieu van de dieren, verlucht met talrijke afbeeldingen.

Er zijn de laatste jaren allerlei studies over deze mijten verschenen en men zal de boeken naast elkaar moeten gebruiken om inzicht te krijgen in de opvattingen van systematiek en naamgeving van de diverse auteurs. In de loop van welhaast 100 jaar zijn vele species herhaaldelijk beschreven en vooral de oudere publicaties veroorzaken veel problemen door te korte beschrijvingen en/of onvoldoende afbeeldingen.

Naar mijn mening is een van de grote verdiensten van dit werk het enorme aantal figuren. Weliswaar wordt gesproken van 516 afbeeldingen, maar de meeste bestaan uit verschillende detailfiguren en aldus komt men op een cijfer van enige duizenden. Beter dan veel woorden kan een goede afbeelding precies laten zien waar bepaalde soortverschillen liggen en hoe die verschillen zijn. Bovendien kan men dan ook nauwkeurig zien op wat voor dier de auteur zich heeft gebaseerd.

Zoals bekend heeft W. HIRSCHMANN de aandacht op zich gevestigd door zijn „Gangsystematik” en het is verheugend dat daarmee in dit boek terdege rekening wordt gehouden. Op grond hiervan krijgen ook de nymfen en de larven veel aandacht. Slechts door de morfologie en de systematiek op verschillende wijzen te bestuderen mag men hopen geleidelijk op het peil te komen dat de soorten en hun kenmerken zodanig vastliggen als bij verschillende orden van insecten reeds is bereikt.

Het recent verschenen werk van Wiktor MICHARDZIŃSKI (Die Familie Parasitidae Oudemans, 1901; Kraków, Polen, 1969, p. 1—690, fig. 1—452) sluit voor een aantal genera zeer prettig aan op het boek van KARG en beide auteurs hebben dan ook veel contact met elkaar gehad.

Het is niet mogelijk bij deze bespreking op details in te gaan. Ik meen dat ik dit boek warm mag aanbevelen bij ieder, die reden heeft zich te verdiepen in de studie van de vrij levende roofmijten. — G. L. VAN EYNDHOVEN.